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DERWENT-WEEK: 199509  
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TITLE: Method for bonding antibodies to sensor substrates  
- useful for prodn.  
of bio-sensors.

PATENT-ASSIGNEE: ANONYMOUS[ANON]

PRIORITY-DATA: 1994RD-0368034 (November 20, 1994)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE
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RD 368034 A	December 10, 1994	N/A
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APPLICATION-DATA:

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APPL-DATE		
RD 368034A	N/A	1994RD-0368034
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INT-CL (IPC): G01N000/00

ABSTRACTED-PUB-NO: RD 368034A

BASIC-ABSTRACT: Antibody attachment which facilitates both geometrical and chemical inducement for a uniform and stable antibody coating comprises depositing carbon fullerene molecules (10) uniformly on highly ordered surfaces of gold (20). Once coated a geometrical inducement to antibody attachment is based on the size and structure of the fullerene molecule (ball shaped), e.g. the fullerene C60 is approx 1nm in dia. As shown in the fig, the concave terminus of the region of an IgG antibody (30) could envelop the fullerene ball if the proper chemical potential exists.

USE - The method is useful for prodn of biosensors.

ADVANTAGE - The use of a nominally inert substrate, e.g. a gold film, provides stable electrical and optical properties in the presence of various ambient gases or solns, thus enhancing the sensitivity to specific changes associated with the fullerene-antibody-endotoxin interaction.

CHOSEN-DRAWING: Dwg.1/1

TITLE-TERMS:

METHOD BOND ANTIBODY SENSE SUBSTRATE USEFUL PRODUCE BIO SENSE

DERWENT-CLASS: B04 D16 J04

CPI-CODES: B04-G01; B05-U02; D05-H10; D05-H11; J04-A06; J04-B01;

CHEMICAL-CODES:

Chemical Indexing M1 \*03\*

Fragmentation Code

M423 M430 M782 M903 Q233 Q435 V600 V611

Chemical Indexing M2 \*01\*

Fragmentation Code

G000 G830 M280 M320 M415 M430 M510 M520 M530 M541

M782 M903 M904 Q233 Q435

Ring Index

90002

Specfic Compounds

23754M

Chemical Indexing M2 \*02\*

Fragmentation Code

A679 C810 M411 M430 M782 M903 M904 Q233 Q435

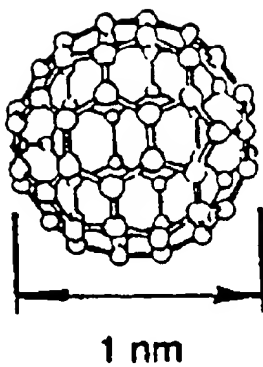
Specfic Compounds

03080M

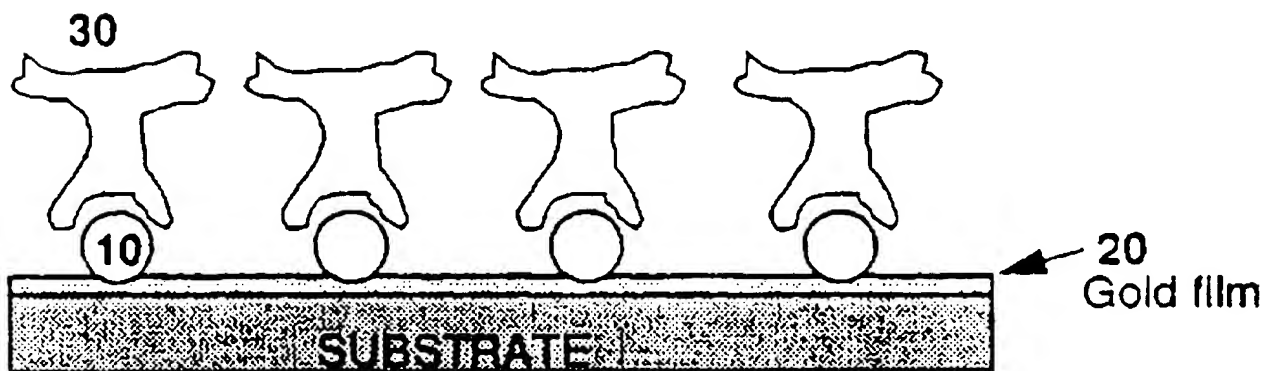
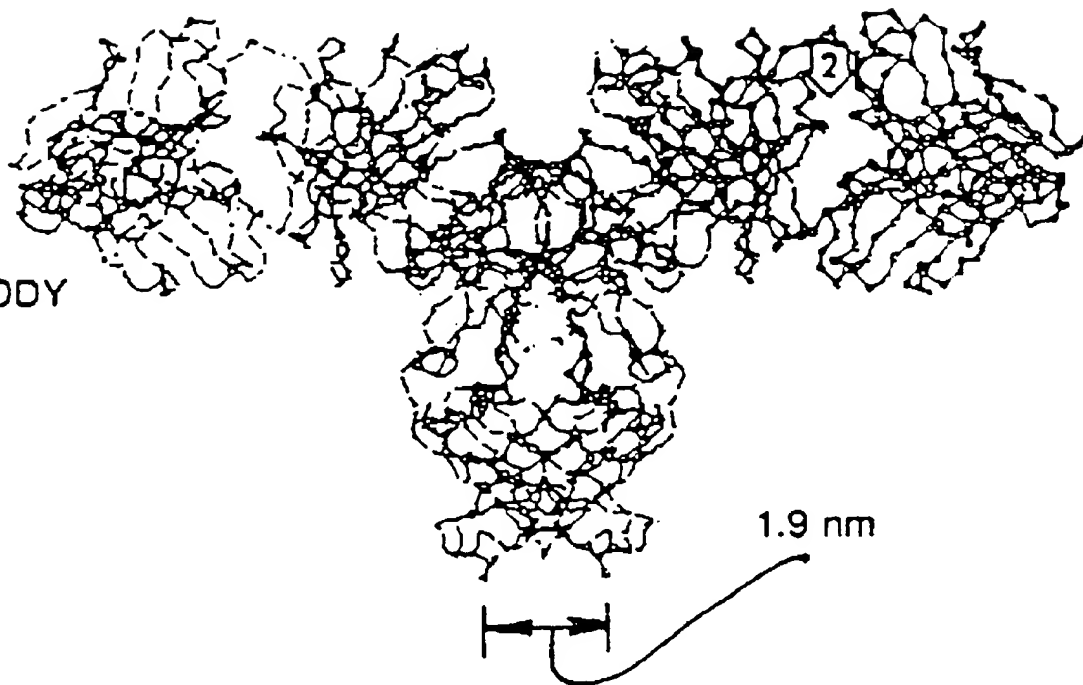
SECONDARY-ACC-NO:

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10  
FULLERENE  
MOLECULE



30  
IgG ANTIBODY



The idea of using antibody biosensors to detect the presence of endotoxins in fluids/vapors is established. The ability to consistently attach and orient macromolecules (such as antibodies) to a surface is crucial in the production of biosensors. Numerous procedures have been developed for this purpose, with varying degrees of complication and success.

We disclose a novel method of antibody attachment which can provide both geometrical and chemical inducement for a uniform and stable antibody coating. We propose the use of carbon fullerene molecules 10 which can be deposited uniformly[1] on highly ordered surfaces of gold 20 as shown in the figure. Once coated with fullerenes, a geometrical inducement to antibody attachment is based on the size and structure of the fullerene molecule (ball shaped). For instance, the fullerene  $C_{60}$  is approximately 1 nm in diameter. As shown in the figure, the concave terminus region of an IgG antibody 30 could envelop the fullerene ball if the proper chemical potential exists. Fullerenes can also be fabricated in larger diameters, in the form of  $C_{70}$ ,  $C_{84}$ ,  $C_{90}$ , etc., to accommodate various antibodies.

The chemical inducement to bonding antibodies may occur naturally as a result of the charge transfer between the fullerene and the gold substrate[2], providing an activated fullerene molecule on the surface. In addition, it has been demonstrated that the fullerenes can be internally and externally doped with metal atoms, and radially bonded with fluorine, hydrogen and other molecular groups. One or more of these chemical modifications may lead to an enhancement of binding to antibody molecules.

Finally, the use of a nominally inert substrate such as a gold film, will provide for stable electrical and optical properties in the presence of various ambient gases or solutions, thereby enhancing the sensitivity to specific changes associated with the fullerene-antibody-endotoxin interaction.

- [1] H. Xu et al., Physical Review Letters 70, 1850(1993).
- [2] Y. Kuk et al., Physical Review Letters 70, 1948(1993).

